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*Medical News Letter*

Vol. 47

Friday, 21 January 1966

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*United States Navy*  
**MEDICAL NEWS LETTER**

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*Policy*

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ceptible to use by any officer as a substitute for any item or article, in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

*Change of Address*

Please forward changes of address for the News Letter to Editor: Bureau of Medicine and Surgery, Navy Department, Washington, D.C. 20390 (Code 18), giving full name, rank, corps, and old and new addresses.

**FRONT COVER:** U.S. NAVAL HOSPITAL, OAKLAND, CAL. The construction contract for the 650-bed hospital replacement project for the Naval Hospital at Oakland, California was awarded in the early part of December 1965. Construction should start during the month of December 1965 or the first part of January 1966.

The new hospital facility will be located at the site of the present hospital complex. The site conditions of hills and valleys presented a design challenge to place the hospital within the steep, hilly terrain and orient it for accessibility and functional efficiency.

As a result of the hilly site the hospital has a basement area. The two floors above the basement have access from ground level. The basic concept of design consists of four floors comprising a base unit and a high-rise nursing unit tower. The building is nine stories high. Penthouse and roof areas are above these nine floors.

The cross-type plan for the nursing units starts at the fifth floor level. The nursing units on the fifth floor contain the neuropsychiatric bedrooms. A neuropsychiatric exercise area is provided on the roof surface at this level. Neuropsychiatric facilities consist of separate units for convalescent patients, medium-disturbed patients, and maximum-disturbed patients. These categories are divided to provide facilities for men and women.

The sixth, seventh, eighth, and ninth floor nursing units contain basically typical facilities for surgical patients, orthopedic patients, medical patients, and OB. The OB facilities are located on the eighth floor. There are two delivery rooms, labor rooms, a recovery room, a preparation room, and nursery facilities. The OB facilities are contained in one wing of the four-wing cross-type nursing unit tower.

The ninth floor contains metabolic research and clinical investigation facilities in addition to nursing units. Included with the nursing units are surgical intensive therapy on the sixth floor and medical intensive therapy on the ninth floor.

The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

and I must admit I spend a good deal of time in trying to determine the cause of leukopenia in our hospital population.

## LEUKOPENIA A GUIDE TOWARD PATHOGENESIS

R. Philip Custer MD\*, University of Pennsylvania School of Medicine, Philadelphia. Postgraduate Medicine 38(5): 536-546, November 1965.

The number of consultations concerning significant leukopenia in our hospital population has increased steadily over the past few years. In most cases the cause of the deficit in circulating leukocytes is determined in short order and the problem resolved to the extent possible. In other cases extensive study and prolonged observation are necessary before the underlying factor is recognized. Occasionally the problem remains unsolved.

Leukocytes resist investigation of their habits in health or disease because of their migration between tissues and circulating blood. Nonetheless some areas of study show promise, particularly in the field of immunopathology. The matter of neonatal leukopenia, for example, resulting from transplacental passage of leuko-agglutinins or leukocytolysins from mother to infant (a situation comparable to erythroblastosis fetalis with respect to red blood cells) has been clearly substantiated. Isoleukoagglutinins are common in persons who have received multiple blood transfusions and may account for some febrile transfusion reactions. Leuko-agglutinins have been demonstrated with increasing frequency in the serum of patients whose leukopenia apparently is due to drug hypersensitivity, the drug probably acting as a hapten to form an antigen when combined with a leukocytic protein constituent. The reliability of such agglutination tests, however, is directly proportional to the experience of the persons performing them; false positive results may follow damage to leukocytes in preparing suspensions, for example. Fluorescent antiglobulin studies will probably supplant the agglutination technics. Leukocytes tagged with radioisotopes may also provide answers to some problems related to leukopenia. Histochemical technics concerned with enzyme systems offer a further area of investigation. Most hospitals, however, are not equipped to provide these special studies.

In contemplating the cause and mechanism of leukopenia in a given patient, I have found it helpful to follow the outline presented in table 1, fully realizing that some of the premises listed are unproved and some are highly speculative.

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Table 1  
PATHOGENESIS OF LEUKOPENIA

- I. Diminished production, normal life span
  - A. Marrow hypoplasia
    - 1. Idiopathic
    - 2. Secondary to effect on precursors
      - a. Chemical agents
      - b. Ionizing radiation
  - B. Marrow dysplasia
    - 1. Aleukemic leukemias
    - 2. Marrow displacement
      - a. Primary or secondary tumors
      - b. Myelofibrosis
      - c. Other myeloproliferative disorders
- II. Normal production, defective maturation
  - A. Vitamin B<sub>12</sub> and folic acid deficiencies
  - B. Arrested maturation(?)
    - 1. Chemical hypersensitivity
    - 2. Other allergies
    - 3. Hypersplenism
      - a. Primary
      - b. Secondary
- III. Normal or accelerated production, impaired circulation
  - A. Retention in normal reservoirs
  - B. Migration to sites of inflammation
- IV. Accelerated production, excessive lysis
  - A. Infectious
    - 1. Overwhelming pyogenic infection
    - 2. Specific infection (viral, salmonellal, etc., with question regarding low chemotactic influence)
  - B. Chemical hypersensitivity
  - C. Hypersplenism (sequestration or major depot of antibody formation)
    - 1. Primary
    - 2. Secondary
  - D. Systemic auto-immune reaction
- V. Pathogenesis unknown
  - A. Chronic idiopathic neutropenia
  - B. Familial neutropenia
  - C. Cyclic neutropenia

No situation calls for a more meticulous history with regard to mode of life, occupation, nutrition, medication, and so on. I recall many instances in which exposure to hazardous exogenous substances has not appeared in the routinely recorded anamnesis. Occasionally this exposure has been occupational, in some cases it has been related to hobbies (gardening, for example), but more frequently the substances have been "over-the-counter" drugs that the patients have not regarded as "medicine."

The physical examination must be equally precise. Some of the many abnormalities that may be significant with reference to the leukopenia are cutaneous reactions suggesting disseminated lupus erythematosus or allergy, mucosal ulcerative lesions, enlarged lymph nodes, splenomegaly or hepatomegaly, and other tumefactions. Occult lymphadenopathy may require lymphangiography or scintigraphy, and unsuspected splenomegaly may be disclosed by radioisotopic scanning (case 4) when the long axis of the enlarged organ lies in a true anteroposterior plane and does not dip below the costal margin.

Study of the bone marrow is imperative and must include examination of histologic sections of aspirated fragments as well as the conventional smears. For safety, we prefer to take specimens from the ilium rather than the sternum, and generally we get adequate sampling. The importance of examination of bone marrow sections is illustrated in case 4. Bone marrow had been aspirated repeatedly and aplastic anemia had been diagnosed elsewhere on the basis of smears alone, whereas sections prepared at our hospital were indicative of chronic aleukemic granulocytic leukemia. The earlier studies were misleading because of dilution with peripheral blood.

Even with the best marrow preparations, interpretation can still be difficult. For example, in the prodromal phase of acute granulocytic leukemia the marrow may be hypoplastic and the only abnormality suggesting leukemia may be a relative increase in myeloblasts. Or a concomitant hemolytic anemia may have provoked such a pronounced reactive erythropoietic hyperplasia that the leukemic proliferation is completely masked (case 3). In either case the peripheral leukocyte count generally will be low. Further, the regenerative phase following granulopoietic depression, especially if provoked by drug hypersensitivity, will provide a marrow so full of myeloblasts and promyelocytes that an objective diagnosis of acute granulocytic leukemia would be justified. This mistake was made in the case of a patient who suffered severe agranulocytosis as a result of hypersensitivity to sulfonamide and who sub-

ssequently recovered. Several months later I submitted the material to members of my staff as an unknown specimen, and the consensus again favored leukemia.

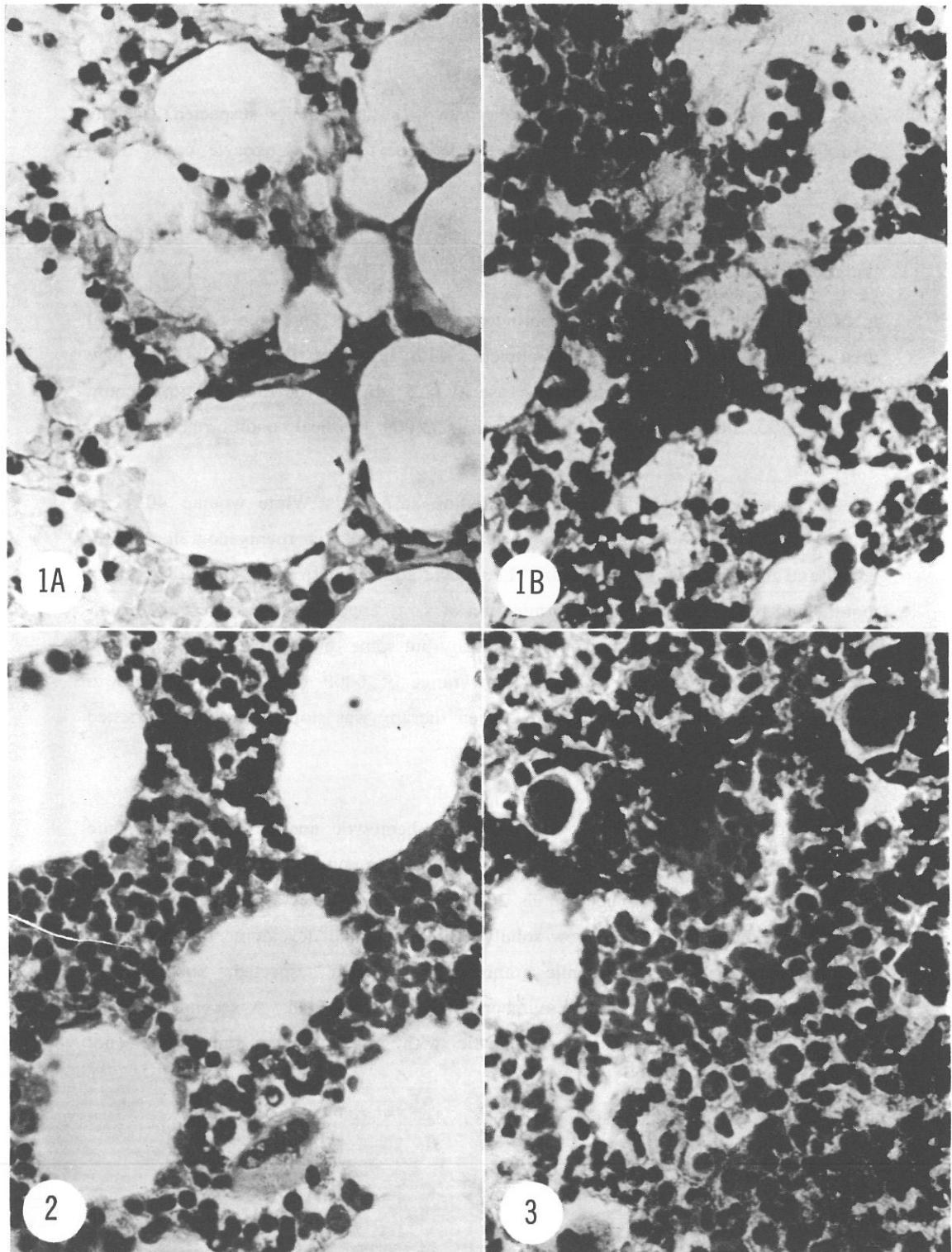
Some interesting individual phases of leukopenia were described recently. In alcoholic subjects, acute bacterial infection (most often pneumococcic pneumonia) brought about hypoplasia of the marrow, reflected in the peripheral blood by leukopenia and occasionally thrombocytopenia. Reactive hyperplasia promptly followed control of the infection, and blood levels rose thereafter. Alcoholics with fatty cirrhosis were then tested for neutrophilic reaction to bacterial endotoxin. The response was poor but improved after 20 days' abstinence from alcohol (this is regarded as a reflection of folic acid deficiency rather than a direct effect of alcohol). Chronic granulocytopenia in a child was ascribed to premature senescence or death of fully developed neutrophils within the marrow, termed "myelokathexis" (retention). Specific stimuli from infection or injection of bacterial endotoxin brought about a brief period of leukocytosis, but corticoid therapy and splenectomy were without effect. The cellularity of the marrow was satisfactory, the ratio of leukocytes to nucleated red blood cells was 5 to 1. All levels of differentiation were found in the granulocytic series, but with an excess of segmented forms, most of which displayed degenerative changes as well as absence of motility and phagocytic activity.

The over-all peripheral blood picture is often helpful in determining the cause of leukopenia (table 2).

Table 2  
CATEGORIES OF LEUKOPENIA ACCORDING TO  
OVER-ALL PERIPHERAL BLOOD PICTURE

- 
1. Pure leukopenia
    - a. Balanced
    - b. Neutropenic
    - c. Lymphopenic
    - d. Monocytic
  2. Leukopenia with anemia
  3. Leukopenia with thrombocytopenia
  4. Panhematocytopenia
- 

Pure leukopenia is generally drug-induced or the result of autoimmune factors and is nearly always neutropenic. When the leukopenia is balanced in type, i.e., when the differential tally is normal, or when it is lymphopenic, one would consider disseminated lupus erythematosus or other so-called collagen dis-

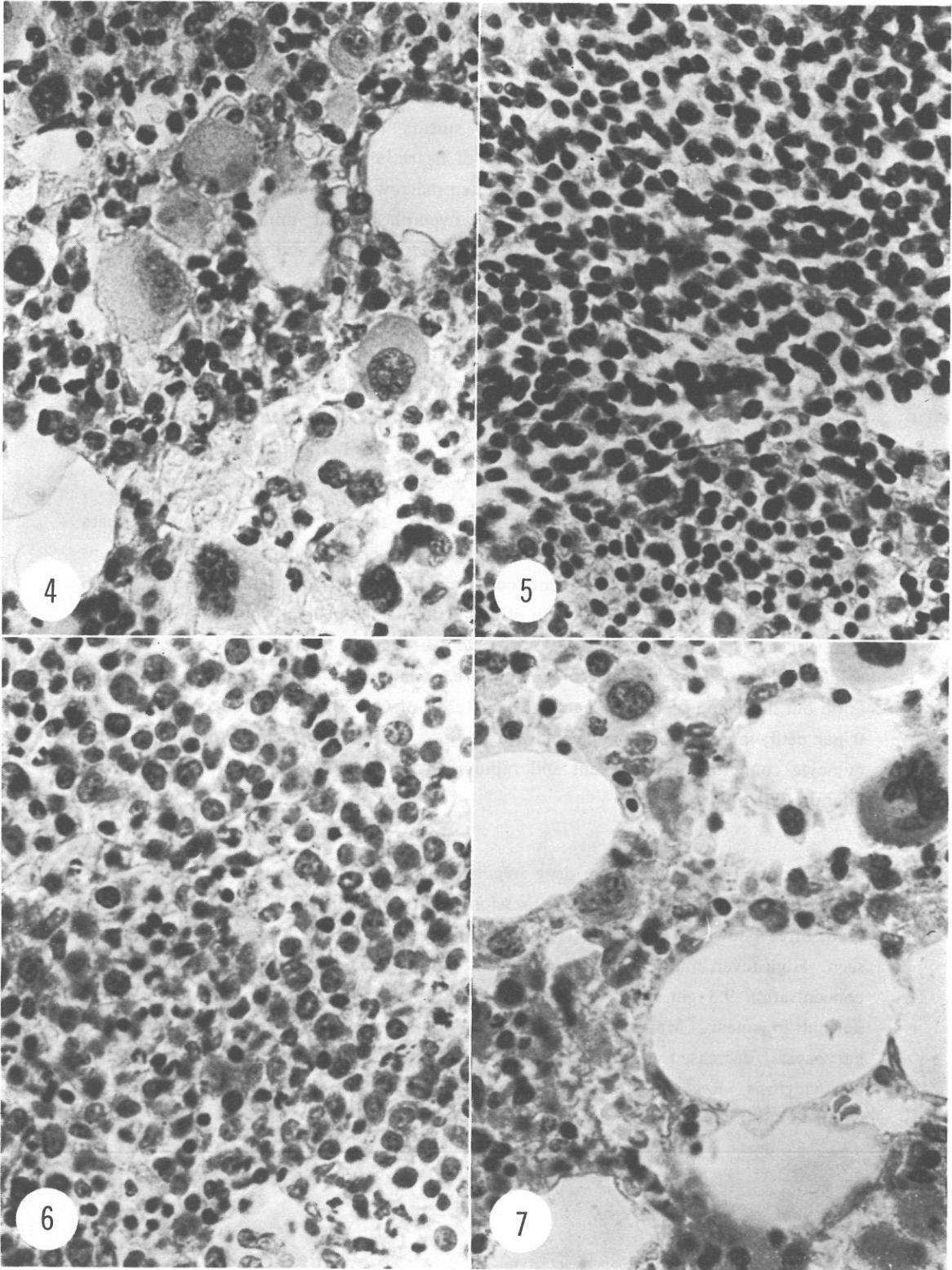


CASE 1. Hypoplastic anemia, cause undetermined (antihistaminics suspected). White man 31 years of age. Asymptomatic. Panhematocytopenia, leukocyte count 1000 to 3700, usually balanced differential count.

- A. Greatly depleted marrow, the persisting cells being mostly erythrocyte precursors, lymphocytes and plasma cells.
- B. Marrow after nine months of continuous corticoid and androgen therapy. Focal area of regeneration, mostly erythropoietic, with much of the marrow elsewhere remaining hypoplastic. Hemoglobin increase to 11.5 gm. per 100 ml. Leukocyte count 3000 to 8500. Platelet count never higher than 33,000. Clinical condition good.

CASE 2. Balanced leukopenia, ionizing radiation suspected. White woman 40 years of age, a medical technologist in a physician's office, had taken roentgenograms unprotected and unmonitored for five years. Leukocyte count fell from 5500 to 2800 in six months and remained low despite termination of x-ray exposure. No anemia or thrombocytopenia. Marrow of normal total cellularity but somewhat reduced in granulocytic components. Leukocyte count increased to range of 6000 to 7000 in response to corticoid therapy. Leukopenia recurred when therapy was stopped and has persisted over 12 year period. Clinical condition good.

CASE 3. Acute aleukemic granulocytic leukemia, hemolytic anemic prodrome. White man 56 years of age. Dyspnea on exertion. Hemoglobin concentration 6.4 gm. per 100 ml., leukocyte count 1400 (neutrophils 26 per cent, 2 myelocytes), platelets normal. No physical abnormalities. Marrow solidly cellular with all developmental series participating in hyperplasia; aleukemic granulocytic leukemia suspected. Subsequently, myeloblasts appeared in increasing numbers in peripheral blood. A second specimen of marrow was predominantly granulocytic with much greater immaturity (not illustrated).

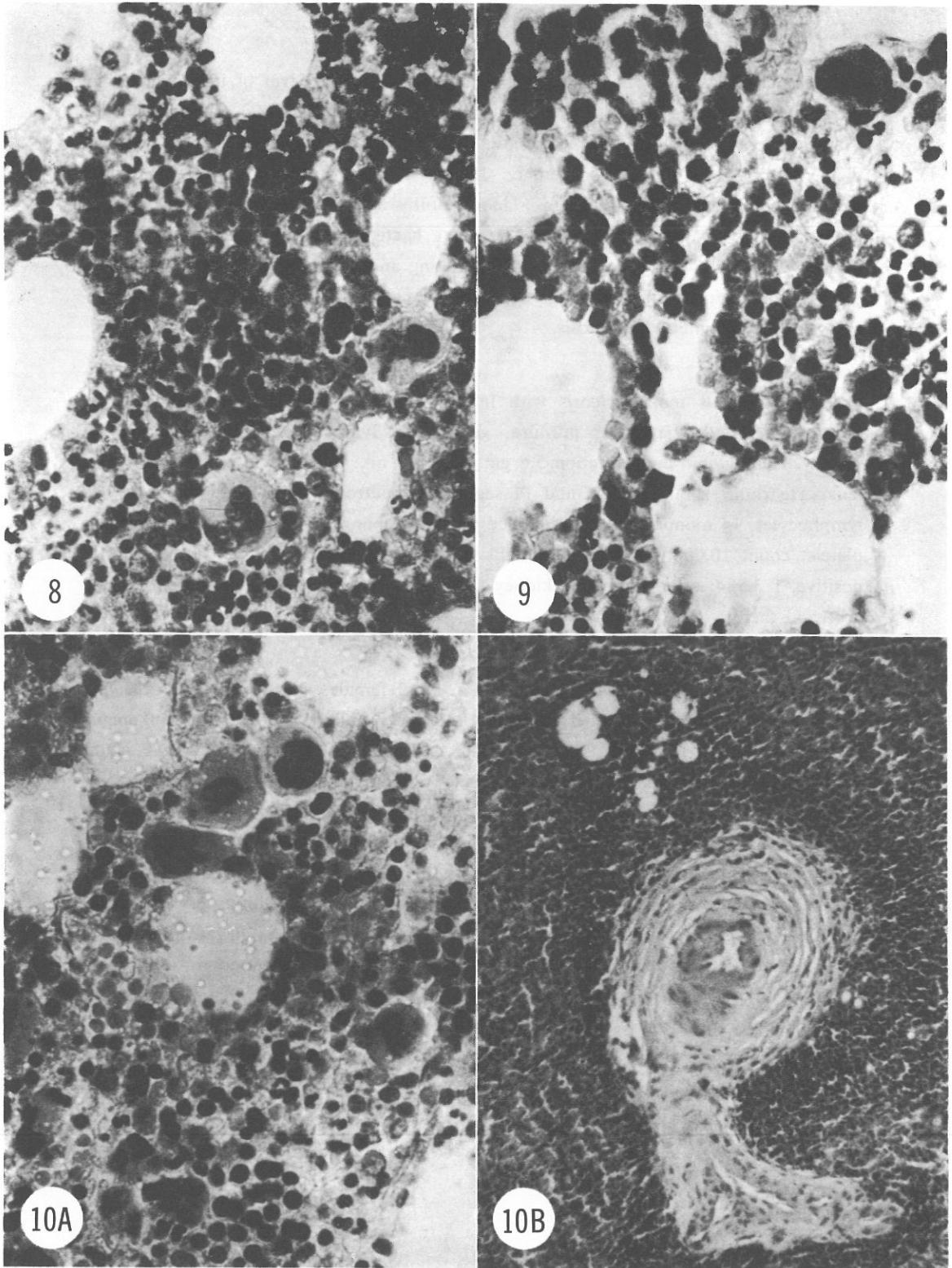


CASE 4. Chronic aleukemic granulocytic leukemia. White woman 77 years of age. Severe congestive heart failure. Hemoglobin concentration 3.5 gm. per 100 ml., leukocyte count 2100 to 6800 with balanced differential count. Aplastic anemia diagnosed elsewhere on basis of marrow smears (diluted with peripheral blood). Hepatomegaly did not recede with control of heart failure. Spleen not felt, but Hg<sup>203</sup> scan gave evidence of splenomegaly. Aspirated marrow units almost solidly cellular with striking granulocytic and megakaryocytic hyperplasia and minimal erythropoiesis. Improvement following therapy with busulfan (MYLERAN®) and androgen.

CASE 5. Lymphomatosis limited to bone marrow. White man 57 years of age. Pancytopenia, leukocyte count 1200 with 45 segmented neutrophils, 55 lymphocytes and 5 monocytes. No physical abnormalities at any time. Marrow almost solidly replaced by lymphocytic lymphoma, a few islands of hematopoietic tissue remaining (lower one-fourth of photomicrograph). Good remission with chemotherapy.

CASE 6. Pernicious anemia modified by inadequate therapy. White woman 33 years of age. Weakness. Given "shot of B<sub>12</sub>" elsewhere (learned later). Hemoglobin concentration 5.1 gm. per 100 ml., hematocrit reading 19 per cent, reticulocyte count 2.6 per cent, leukocyte count 3600 with slight neutropenia, platelet count 70,000, serum iron concentration 63 mcg. per 100 ml., no free gastric hydrochloric acid. Marrow solidly cellular with erythrocyte precursors predominating and showing abnormal maturation but not being typically megaloblastic. Result of Co<sup>57</sup>-B<sub>12</sub> absorption test (Schilling), 0 per cent; increase to 10 per cent with addition of intrinsic factor. Increase of reticulocyte count to 17.8 per cent and rapid recovery following adequate therapy with vitamin B<sub>12</sub>.

CASE 7. Acute agranulocytosis, drug hypersensitivity. White woman 59 years of age. Treated at a private hospital for depression and osteoarthritis. Fourteen medicaments used, three known to depress marrow in sensitive persons. Patient critically ill when first seen. High fever, multiple skin lesions (hemolytic *Staphylococcus aureus*). Hemoglobin concentration 9.3 gm. per 100 ml., leukocyte count 700 (all lymphocytes), platelets normal in smear. Marrow showed normal erythrocyte precursors, increased megakaryocytes, decreased granulocytes with none beyond myelocyte stage, and reactive plasmacytosis. Recovery following intensive antibiotic therapy. Increase of leukocyte count to 4300 with reappearance of neutrophils.



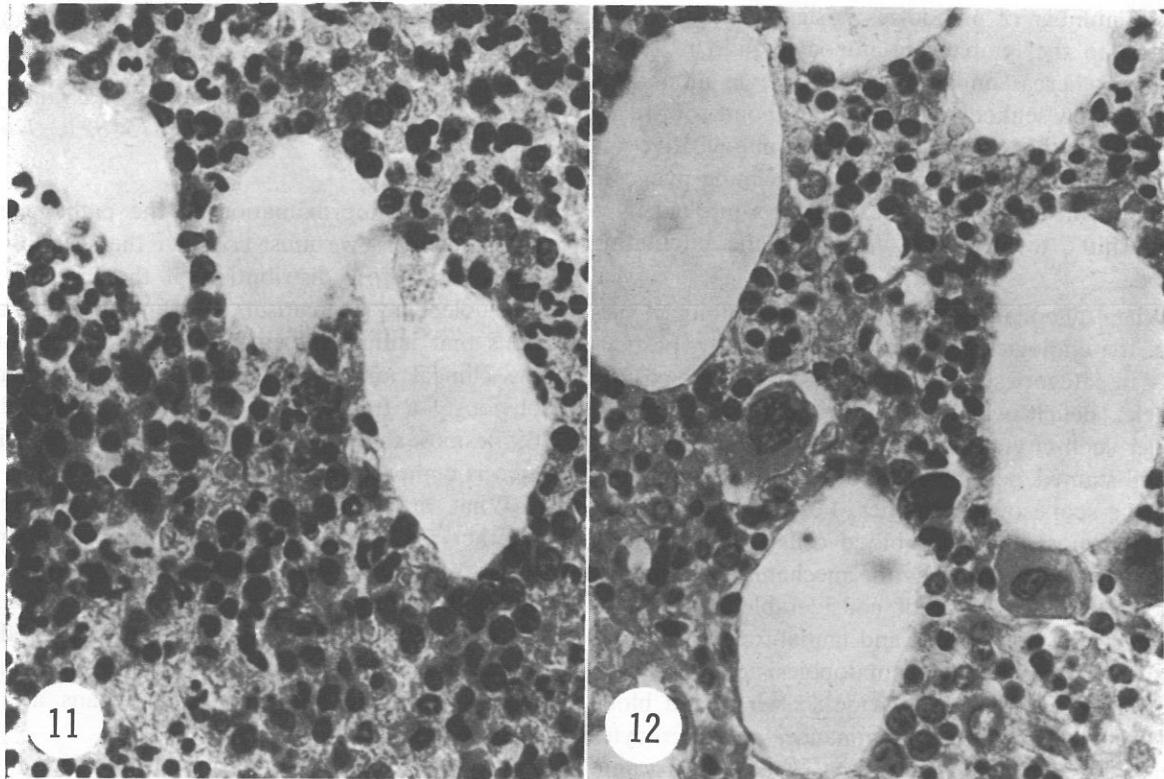
CASE 8. Bacterial infection. White woman 68 years of age. Fever of unknown origin. Hemoglobin concentration 11.7 gm. per 100 ml., leukocyte count 800 (1 promyelocyte, 4 myelocytes, 4 band forms with toxic granulation and Döhle's bodies, 91 lymphocytes), platelets moderately increased in number. Loud systolic murmur over entire precordium, questionable splenomegaly. Repeated blood cultures negative (antibiotics given prior to admission). Presumptive diagnosis of subacute bacterial endocarditis. Marrow strikingly hyperplastic with granulocytes predominating and maturing well, and many band and segmented forms in marrow tissue. Massive penicillin therapy. Clinical improvement and neutrophilic leukocytosis.

CASE 9. Infectious mononucleosis with hypersplenism. White girl 17 years of age. Sore throat, fever, jaundice, purpura, generalized lymphadenopathy, hepatosplenomegaly. Hemoglobin concentration 5.6 gm. per 100 ml., reticulocyte count 9 per cent, leukocyte count 1700 (1 band and 11 segmented neutrophils, 26 prolymphocytes, 40 lymphocytes, 14 monocytes, 8 unidentified cells resembling blasts but without nucleoli), platelet count 10,000. Marrow essentially normal. Screening heterophil antibody titer positive, 1:3,584; after guinea-pig kidney absorption, 1:896. Rapid recovery following corticoid therapy.

CASE 10. Systemic lupus erythematosus in a white female, age 41. Patient receiving antihistaminic treatment for allergic rhinitis referred by allergist because of leukopenia and ecchymoses. Hemoglobin concentration 12.6 gm. per 100 ml., leukocyte count 2800 (61 segmented and 2 band neutrophils, 35 lymphocytes, 1 eosinophil, 1 monocyte), platelet count 75,000. Panhematocytopenia increased. Marrow hyperplastic (A) with erythrocytic precursors and megakaryocytes predominating. Renal studies showed 30 to 40 per cent residual function with impairment of vascular, glomerular and tubular components. Diagnosis rested between disseminated lupus erythematosus and subacute glomerulonephritis. Repeated L.E. studies on blood negative. Presence of mild diabetes also demonstrated. Splenectomy performed. Perivasculär "onionskin" proliferation throughout organ (B), verifying diagnosis of lupus. Demonstration by renal biopsy of proliferative glomerulonephritis with rare "wire loop." Striking hematologic response to splenectomy and pronounced improvement in renal function with chloroquine therapy.

eriously to trigger admissions and hospitalizations and to reduce stress on the diagnostic work-up and therapeutic approach.

Cells may differentiate toward megakaryocytes according to their growth determinants in response to specific influences, such as hypoxia and radiation. A similar shift in cell differentiation



11

12

CASE 11. Chronic idiopathic neutropenia. White man 70 years of age. Vague upper abdominal pain, never explained. Leukopenia known for three years. Leukocyte count 1800 to 4600 (neutropenic and monocytic at low levels, balanced at higher levels). Mild normocytic normochromic anemia, minor inconstant thrombocytopenia. No significant physical findings. Marrow strikingly hyperplastic with predominance of granulocyte precursors and good maturation of band and segmented forms within tissue. Repeated sampling showed increasing proportion of granulocytes. Increase in leukocyte count and hemoglobin value, absolute decrease in monocytes, and subjective improvement during short periods of corticoid therapy. Clinical condition good.

CASE 12. Chronic idiopathic neutropenia. White woman 75 years of age. Severe leukopenia for 22 months before death from staphylococcal pneumonia. Leukocyte count never higher than 3000, usually less than 2000, frequently less than 1000, always neutropenic. Concomitant anemia due to bleeding diverticulosis of colon. Platelet count nearly always high. Hyperplasia of erythrocyte precursors and megakaryocytes in marrow, depression of granulocyte progenitors with "maturation arrest" at myelocyte stage. No significant response to repeated corticoid therapy.

eases, although cancer chemotherapy with alkylating agents or antimetabolites may likewise produce this picture, the lymphocytes being especially susceptible to the effects of these agents. A reduction in the number of monocytes is significant only with respect to the lymphocyte-monocyte ratio in tuberculosis, whereas an absolute increase in monocytes within a low leukocyte count would point toward an infection with a virus or certain gram-negative organisms. Neutropenia due to overwhelming pyogenic infection, in contrast, is nearly always marked by a "left shift" to immature forms in the circulating blood.

When anemia compounds the hematologic picture, the etiologic spectrum expands greatly, particularly in categories I, II and IV in table 1. Coexisting platelet deficit widens the spectrum even further. Under such circumstances a thoughtful inspection of a well-stained peripheral blood film will often narrow the scope of possibilities. For example, normocytic normochromic red blood cells would point to diminished production as the mechanisms of pancytopenia. The presence of considerable numbers of nucleated red blood cells and immature granulocytes signifies extramedullary hematopoiesis compensatory for marrow dysplasia. A wide scatter in red blood cell diameter with predominance of macrocytes speaks for defective maturation, especially if granulocytes are hyperlobate and large. Accelerated erythropoiesis in the marrow is manifested by distortion in size and shape of red blood cells, and an admixture of spherocytes strongly suggests an autoimmune hemolytic state. A significant increase in the number of giant platelets in the face of thrombocytopenia is frequently seen in chronic granulocytic leukemia and other myeloproliferative disorders, as well as in autoimmune thrombocytopenia. The physician can acquire additional bits of information if he will take the time and trouble to examine the blood film carefully. These observations do not require the services of an experienced hematologist and may serve to direct the subsequent investigation more quickly into proper channels.

More sophisticated studies related to the anemia will often throw light on the associated leukopenia. The  $\text{Co}^{57}$ - $\text{B}_{12}$  absorption test (Schilling) alone and coupled with intrinsic factor, is generally diagnostic of pernicious and related anemias, while  $\text{Cr}^{51}$ -tagged red blood cells will disclose the short life span characterizing autoimmune hemolysis more precisely than the Coombs tests or serum titers against enzyme-treated erythrocytes, providing there is no con-

comitant blood loss. Comparable tagging of platelets has also been done, although some doubt exists as to its reliability.

## PATHOGENESIS OF ATHEROSCLEROSIS

*Arnold L. Brown Jr, MD, Section of Experimental and Anatomic Pathology Mayo Clin Proc 40(11):815-821, November 1965.*

As a first approximation to the pathogenesis of atherosclerosis, we must consider the seeming vagaries of the gross distribution of the disease. While the molecular mechanisms and fine-structure alterations that initiate the process are of much interest, the clinical manifestations and their treatment are obviously a function of the precise localization of the lesions and the extent to which the arterial lumen is compromised.

What are some of the factors that determine whether the arterial system will develop atherosclerosis? Vessel size is of considerable importance. The larger the artery the more likely it is to develop the disease. Thus, the aorta, particularly in its abdominal portion, is highly vulnerable, while the small arteries within the parenchyma of organs are infrequently affected.

Blood pressure is another important factor. If the infiltration hypothesis of atherosclerosis is correct, and I shall deal with this presently, then the entrance of lipid into the arterial wall would appear to be a direct function of the intraluminal pressure. In an ingeniously planned experimental approach to this question, Duncan has developed evidence that the entrance of lipids into the arterial wall is not a direct consequence of pressure itself but is secondary to an indirect effect of pressure, namely that of stretching the components of the arterial wall. High blood pressure, with several notable exceptions, however, does not predispose specific arteries to atherosclerosis so much as do a number of abnormalities that create the necessary conditions for the molecular events that initiate and perpetuate the disease.

Turbulence is another general factor. Observations in experimental models clearly show that where turbulence exists and where the other conditions are satisfied, atherosclerosis will develop. Again, it is the larger vessels that are most affected, for it is here that turbulent flow is most likely to occur and, in fact, almost invariably does.

Two other important factors should be mentioned. One of these is injury. Although difficult to demonstrate in man, experimental observations have

contributed considerable evidence to support the view that atherosclerosis will develop at sites of arterial wall injury, often to the exclusion of uninjured portions of the arterial system. The injury may be severe but more often it is slight. The other factor is an increase in the lipid content of the blood. This cannot be elaborated upon here and probably does not need to be in view of the widespread discussion of the subject.

I have given you no criteria that will allow you to study a given patient and to predict which of his various arterial systems will become involved with atherosclerosis. No such criteria exist. But it is a fact, quite unexplained, that the distribution of atherosclerosis follows a most diverse pattern. For example, extensive coronary disease can occur in the presence of little or no aortic involvement, and severe occlusions of the femoral artery may exist without coronary disease. The number of combinations of involvement of the major arterial systems approaches 4,000. This is a measure of our problem.

Speculation on the pathogenesis of atherosclerosis is not a recently developed field of interest. In 1821 Rokitansky, paragon of pathology and ruler of all he surveyed in the medicine of Vienna of that day, proclaimed that atherosclerosis was due to the encrustation of fat on the intimal surface of an artery. In his view the disease became worse as additional fat was deposited. In the 1850's, Virchow, an even more commanding figure of his time, developed the theory of imbibition. This idea, considered to contradict the encrustation hypothesis, was that fat was imbibed or taken into the wall of the artery. These two concepts have waxed and waned in their popularity through the years and, as so often is the case with fervently held and seemingly contrary views, it now appears that both are correct.

As background information, I would like to discuss very briefly a concept that has developed of a mechanism which appears to be responsible for the transport of materials across cell walls. This will have some relevance to a further discussion of the pathogenesis of atherosclerosis. More than 30 years ago, Lewis developed the idea that cells not only could take into themselves such particulate matter as bacteria by the process of phagocytosis but also were able to take in fluids. This mechanism he called pinocytosis, or the drinking of fluids. His concept lay fallow for some years until the electron microscope made it possible for finer observations on cells to be made. It appears that the cell cytoplasm is capable of creating crater-like structures that literally reach

out and grab onto molecules, sequester them into the cytoplasm and form vesicles which drop into the cytoplasm and pass across the cell to deposit their load of molecules in the adjoining intercellular space.

The capillary, because of its active transport activity, is especially suited to demonstrate pinocytosis. The process, however, appears to be a general property of cells, including the endothelial cells lining the arteries.

Despite some 15 years of intensive study by electron microscopy, our concept of the structure of the arterial wall is little changed now from that of 50 years ago. Endothelial cells, which are flat and closely approximate one another, line the internal surface of the lumen. In the subendothelial space lying between the endothelial cells and the internal elastic lamella, smooth muscle cells are occasionally found. Beneath this is the internal elastic lamella and below that the smooth muscle and the elastic tissue of the media.

If a rabbit is subjected to an acute hyperlipemia, the earliest lesion is an encrustation of fat on the endothelial cytoplasm. This process is not generally called encrustation in the modern view, but let us return to Rokintansky's term, for it is indeed an encrustation of lipids upon the endothelial cell. The next thing that is seen is a beginning transport of this lipid into the cytoplasm of the endothelial cell by pinocytosis.

For some years, splintering of the internal elastic lamella has received considerable emphasis as an important part of the atherosclerotic process. It was thought that holes developed in the elastic tissues and that lipid could then pass through this barrier into the underlying media where it was associated with atrophy and degeneration, a prominent part of the atherosclerotic plaque. Some investigators think that a molecular interaction occurs between the lipid that is infiltrating through from the overlying endothelial cell and the elastin. A molecular disarrangement then develops which allows a sieve-like effect to become operative and the lipid drips through into the media.

In the events that culminate in the atherosclerotic plaque, there are an endothelial cell, the subendothelial space, the internal elastic lamella, and the smooth muscle cells in the media. Lipid encrusts upon the surface of the cytoplasm of the endothelial cell; it is then imbibed, to use Virchow's term, and is transported through the cell by the process of pinocytosis. It then becomes deposited in the subendothelial space where it is taken up by smooth muscle

cells, fibroblasts, and other cells that move in from the media. This lipid is highly irritating and is treated by the arterial wall as a foreign body. This foreign-body reaction, with resultant fibrosis and scarring, is an integral and important part of the atherosclerotic lesion.

I would like now to dispose of two ideas that have fairly wide acceptance among physicians. One is that atherosclerosis is an invariable accompaniment of the aging vascular system. The other is that the dis-

ease is irreversible. Neither is true. Observations in man as well as in the experimental animal over many years have shown that atherosclerosis can, in fact, be reversed. The mechanisms by which such reversal can be effected and the disease prevented have been largely of a dietary nature. Our views on atherosclerosis, based on a painstaking, sometimes halting, and often confused marshalling of data, leave no room for doubt that this disease need not be a necessary part of the aging of the vascular system. Atherosclerosis is preventable and it is reversible.

## FROM THE NOTE BOOK

### EXPLOSION RISK IN A "NON-FLAMMABLE" SYSTEM

*A. Bracken BSc, PhD, FRIC, Senior Scientist,  
C. C. Wilton-Davies, MA, Scientist, Scientific  
Division, British Oxygen Co Ltd.*

The possibility of an explosion occurring when trichlorethylene, and nitrous oxide are the only volatile anesthetics in use is rightly held to be remote. Inadvertent contamination of the gas stream by cyclopropane or ether however, can introduce a serious hazard. Forester recommends that the cyclopropane cylinder as well as the ether bottle should be re-

moved from the apparatus if non-explosive conditions are to be guaranteed. The present account of some investigations into a violent explosion occurring when trichlorethylene was used and conditions were supposedly non-explosive supports this view. In addition it is shown here that it is advisable to remove the trichlorethylene and halothane bottles when cyclopropane is used in order to prevent its solution in the liquid and subsequent discharge into the anesthetic circuit; and to flush out these bottles and the rebreathing bag just before use with a stream of oxygen.

—BUMED CODE 73.

Reference: Anesthesia 18(4): October 1963.

### BLOOD CELL SEPARATOR DEMONSTRATED AT NIH

*U.S. Medicine 1(11): 39, November 1965.*

A continuous-flow blood cell separator, developed jointly by the National Cancer Institute and International Business Machines Corporation, was demonstrated publicly for the first time at the 15th Annual Research Equipment Exhibit and Instrument Symposium at NIH, Bethesda, Md.

Designed to automate the separation of blood

components, particularly for the treatment of leukemia patients, the instrument operates on the principle that the blood components have different sedimentation rates when spun at relatively low speeds in a centrifuge.

The equipment was demonstrated separating blood into plasma, red-cell and white-cell fractions. It also is capable of being used on a continuous flow basis—channeling blood from a separator and back to the donor after removal of certain components needed for transfusion.

### Objectives Cited

One of the major objectives is to produce high yields of white cells from normal blood. With present methods of single batch blood fractionation, one type of white blood cell, the granulocyte, which can combat infection in leukemia patients, has not been obtainable in sufficient concentrations to be useful, because only a small proportion of an individual's total white blood cells is in the circulating blood.

Drawing a donor's blood into the separator on a continuous-flow basis would make it possible to obtain from the blood of a single donor the granulocytes needed for one transfusion, now requiring more than 30 normal donors.

A second objective is to obtain platelets which are needed to control hemorrhage in leukemia patients. These cell-like bodies which have an important function in the clotting of blood are separated by the instrument from platelet-rich plasma in a second stage, after the plasma has been separated from whole blood. This is feasible now with the present machine.

### Another Objective

Another objective is to obtain useful quantities of another type of white blood cell, the lymphocyte, which produces antibodies in the immune response of an individual to a foreign antigen. The availability of lymphocytes in large quantities would therefore have important application in the entire field of medical research, particularly investigations of organ transplants.

Two other types of blood cell separators, developed by NCI scientists and IBM engineers, also were displayed at the symposium—a plasma separator and a density gradient centrifuge.

The plasma separator was designed to reclaim plasma from blood whose red cells are too old to be suitable for transfusion. It also separates white cells and platelets from plasma and can be adapted to remove glycerol which is added to blood before freezing. Glycerol is needed for successful freezing, but it cannot be transfused.

The density gradient centrifuge separates small volumes of cell types, such as leukemic white cells or liver cells, into groupings of each cell type.

### ESTABLISHMENT OF INTERAGENCY COMMITTEE ON LABORATORY MEDICINE

The following announcement was published in the Federal Register on October 23, 1965.

Interagency Committee on Laboratory Medicine—Establishment And Functions. In recognition of the need for cooperation and concerted action among Federal agencies having major medical programs, an Interagency Committee on Laboratory Medicine was established August 24, 1965. The permanent members of the Committee shall be representatives of the Chief Medical Director, Department of Medicine and Surgery, Veterans Administration; and of the Surgeons General of the Army, Navy, and Air Force, Department of Defense; and the U.S. Public Health Service, Department of Health, Education, and Welfare. Representatives shall be designated by the head of the agency or department concerned and shall be authorized to speak for the agency or department on matters pertaining to laboratory medicine. . . . The Committee shall meet regularly once each month, and additional meetings may be called by the Chairman as necessary.

Functions of the Committee. The Committee shall study, consider, and maintain a laboratory workload reporting system, and give consideration to related matters such as productivity indices, staffing patterns and space allocation.

Termination. Continuance of the Committee shall be subject to biennial review.

The establishment of the Interagency Committee on Laboratory Medicine is a significant event, since it provides an official mechanism whereby pathologists and other laboratory personnel in the concerned agencies can work together in the delineation of and solution of problems in their sphere of activity. Through exchange of ideas and concerted action, improvements in the administrative aspects of laboratory medicine may be anticipated.

### THE CLINICAL BEACHHEAD

Dawn was still a few hours away as the large Amphibious Transport Ship silently slipped into sight of shore. USS PAUL REVERE was the command ship for an operation dubbed "Blue Marlin". Within a very short time, U.S. and Vietnamese Marines would be on their way from PAUL REVERE, and other ships of the task group, to come across the beach near Tam Ky, a small village located about 10 miles northwest of Chu Lai, Republic of Vietnam.

The area is Viet Cong country, but this time the enemy chose not to fight. The V.C. withdrew from the beach and presented minor opposition in the form of small arms fire and harassment. Thus the beachhead was soon secure and the villagers

crowded down to the sea to observe the activities of the ships off-shore.

Back on PAUL REVERE, Lt. Ernest Simms, the ship's doctor, from San Diego, California and Alphonso Gonzales, a hospital corpsman from San Diego, California were climbing into a helicopter for a trip into the beach. They carried with them, besides the normal supply of medical equipment, a five hundred pound bag of rice. They had a mission that was quite different than that of the Marines who had gone ashore ahead of them. They were going to provide aid to Tam Ky in the form of medical treatment and food. As their chopper landed, they found that two Navy Corpsmen with the Marines had set up a make-shift sick bay by drawing two native boats together. As the people filed past, Dr. Simms and his assistants put their skill and knowledge to work in an effort to help.

Since there was a language barrier and no translators available, this unusual "mass housecall" was carried on by using gestures and simple Vietnamese



Ernest Simms, LT, MC, USN Ship's Doctor for the Attack Transport Ship USS PAUL REVERE (APA 248) Administers Medicine to the Infected Eyes of a Vietnamese Villager Near the Village of Tam Ky During Operation "Blue Marlin."

phrases. Difficult though it was, the seagoing doctor was able to treat a multiplicity of illnesses from ulcers and skin diseases to dysentery.

A doctor is trained to have a hard heart when treating sickness, but how can a person be unaffected by a child? How can anyone not be touched by a mother who holds her baby up to this man, and without saying a word says "do something for him?" The boy was suffering from malnutrition, all he needed was food. Out came the "C" rations and the powdered milk. With simple instructions to the mother, her son was on the road to recovery.

And how did these people react to the friendship offered? They were thankful and showed it by helping the medics to do their job.—Story by LT JG T. E. Sleeper. Photo by: Jean C. Cote, PH1.

#### THE STITT AWARD PRESENTED TO CAPTAIN J. W. MILLAR



The Stitt Award is presented to CAPT Jack W. Millar MC USN, by Dr. George W. Rogers, Associate Medical Director, Pfizer Laboratories Division, Chas. Pfizer & Co., Inc. The award is presented annually by the Association of Military Surgeons for outstanding achievement in medical research. CAPT Millar, Director of the Preventive Medicine Division in the Navy's Bureau of Medicine and Surgery, received the award for his outstanding contributions toward the control of infectious diseases in American servicemen in SE Asia and in the U.S. In presenting the award, Doctor Rogers pointed out that CAPT Millar's constant effort has been "a major contribution to the health of American servicemen and eventually to all people."—J Armed Forces 103 (13): 9, 27 November 1965.

#### CORTICOSTEROIDS

Glaucoma: Untold glaucomatous damage to optic nerves occurred during the period when physicians were furnished steroid-antibiotic preparations designed to cure ocular disease without the benefit of

etiological diagnosis. This situation, unfortunate as it was, may yet prove to serve a useful purpose. The present authors demonstrate that the offspring of patients with primary open-angle glaucoma show at least two degrees of responsiveness of intraocular pressure to topical corticosteroids. Such responsiveness may be conditioned through recessive inheritance. Approximately 30 per cent of the general population are carriers of the glaucoma gene and are heterozygous (ug); about 5 per cent are homozygous (gg) and will eventually have glaucoma; and 65 per cent have no glaucoma gene and are homozygous normals (nn). Normals show minimum intraocular pressure rise when challenged with topical corticosteroids. A maximum rise can be expected in persons with a double dose of the gene (gg), an observation borne out when known open-angle glaucoma patients (gg) are treated with corticosteroids. Heterozygous carriers (ng) have a pressure response intermediate between these two. The offspring of a known patient with glaucoma will have a pressure response to corticosteroids as predicted by Mendelian principles of inheritance. The practical application of this concept is important. Obviously, any pa-

tient treated with corticosteroids should be watched for intraocular pressure elevation. If it occurs it does not prove the diagnosis of glaucoma but the patient should be considered a glaucoma suspect. Families of known open-angle glaucoma patients should be warned of the risk and urged to have periodic examinations. The absence of pressure elevation after six weeks of corticosteroid testing suggests that the patients will never have glaucoma. Further investigation is needed but it now seems that patients with the genotype for glaucoma may be identified by the magnitude of intraocular pressure response to topical corticosteroids.—Becker & Ballin (St. Louis, Mo.), Arch Ophthalmol 74: 621, November 1965; Shaffer (Ed. Comment), Ibid. 594.

**Herpetic Keratitis:** Treatment of herpetic keratitis with preparations containing steroids, antibiotics, and idoxuridine may lead to development of secondary mycotic infections. This note of warning was sounded after the author encountered just such a situation.—Moses (Cleveland, Ohio), Arch. Ophthalmol 74: 701, November 1965.—Republished from CLIN-ALERT No. 310, December 4, 1965, by permission of Science Editors, Inc.

## DENTAL SECTION

### DISPOSABLE DENTAL FACE MASKS FOR USE WITH AIR TURBINE DRILL

Travaglini, E.A. and Larato, D.C., J Pros Den 15: 525-527, May-June 1965.

When the air turbine drill is being used, the propelling force of the air from the drill causes the patient's saliva, water spray, tooth debris and microorganisms to be ejected from the mouth. A microbial aerosol is created that contacts the faces of the patient and the dentist.

Masks made of paper and clear plastic can protect both the dentist and his patient from the aerosol.

A clear, flexible, plastic sheet is attached to the upper part of a disposable paper face mask by stapling or sewing the plastic to the paper. The mask is disposable. It may be used over eyeglasses without impairing visibility. Facial contact of the plastic shield against the eyes and forehead is maintained by the tension of the elastic earbands of the paper part of the mask. The same type of mask protects the patient; when used on the patient, the paper part

of the mask is tucked loosely under the lower part of the nose. This allows a free passage of air into the nasal openings for breathing, but blocks entry of the aerosol.

(D ABS 10(9): 563-564, Sept 1965. Copyright by the American Dental Association. Reprinted by permission.)

### REQUIRED ROLL OF *BACTEROIDES MELANINOGENICUS* IN MIXED ANAEROBIC INFECTIONS

Socransky, S.S. and Gibbons, R.J., J Infect Dis 115(3): 247-253, 1965.

This study tends to support and extend the previously developed hypothesis that *Bacteroides melanogenicus* plays an essential role in certain synergistic anaerobic infections of the oral mucous membrane. Three types of mixed cultures were used as primary inocula for study: (1) the predominant anaerobic cultivable flora of the human gingival crevice, (2) intestinal anaerobic flora of gnotobiotic mice in which human oral flora had been estab-

lished, and (3) the predominant cultivable anaerobic human intestinal flora. Through selective culture, the naturally occurring *B. melaninogenicus* was deleted from those primary inocula; and known strain K110 of that organism was added. By subcutaneous injection of cultures in the groin of guinea pigs, the infectivity of selected cultures was demonstrated by death, development of spreading necrotic lesions, or development of a localized transmissible abscess. To verify transmissibility of an experimental abscess, exudate was inoculated into fresh guinea pigs. Exudate from experimental abscesses was also subcultured to survey the organisms present.

The resultant guinea pig infections were of two types: a discrete localized abscess containing foul smelling exudate which readily transmitted the infection to subsequently injected animals; and a rapidly spreading infection which perforated the abdominal wall, either interiorly causing death, or exteriorly causing denudation. The latter spread so rapidly that it was difficult to aspirate exudate; but when obtained, the exudate readily infected secondary animals. All inocula which lacked *B. melaninogenicus* failed to produce transmissible infection. Addition of *B. melaninogenicus* to any of those mixtures restored transmissible infectivity. These results suggest that oral mucous membrane infections previously considered nonspecific, may be dependent on the presence of *B. melaninogenicus*. This organism, ubiquitous to the oral mucous membrane, appears to come closer to being an overt pathogen than any other bacterium normally residing in high numbers on the mucous membranes of man.

#### THE SPEECH PATHOLOGIST VIEWS DENTAL ENVIRONMENT

*Bell, E.S., J Dist Columbia D Soc 39(2):  
7-9, 13 June 1964.*

The solution of common speech problems of dental origin requires close cooperation between the speech pathologist and the dentist.

Although unusual size or shape of oral structures may contribute to a speech disorder, many persons can compensate for such structural irregularities and speak satisfactorily in certain contexts. The speech pathologist must be careful when relating findings

from examinations of the speech mechanism to the speech disability or imperfections observed.

Among dental anomalies of interest to the speech pathologist are malocclusion, open bite, closed bite, cross-bite, malpositioned single teeth, premature loss of teeth, cleft palate, denture problems, and difficulties arising from the size and mobility of the tongue.

In various types of malocclusions the difficulty in speech generally is found in those articulatory movements which produce hissing or friction noises (Palmer, 1948). Sounds often affected by malocclusion include the voiced and voiceless th, f, v, s, z, r, l, p, b and m.

Open bite often causes difficulty in producing f, v, p, b, m, and th and, infrequently, s and z (Kessler, 1954).

Maxillary anterior protrusion with open bite and tongue thrusting may result in defective production of th.

Closed bite occasionally causes a speech defect because the tongue has too little space for normal movement, so that most sounds are muffled (Kessler, 1954).

Excessive overlapping of the lower front teeth with the posterior teeth in occlusion, or a malpositioned single tooth, may result in poor articulation or mumbled syllables.

The loss of upper anterior teeth may result in the same sort of defective speech as that resulting from Class II malocclusion.

Patients with cleft palate often correctly pronounce only three sounds m, n, and ng. Patients with cleft palate may articulate adequately when speaking slowly but speak inadequately at faster rates.

A denture may be perfect from the standpoint of appearance, comfort and function and still be the leading cause of distortion in the wearer's speech. Macroglossia often produces muffled sounds. Both macroglossia and microglossia may result in sound substitutions, omissions or distortions, especially of the linguopalatal and linguo-alveolar sounds.

Lisping and difficulty in the production of the sibilant sounds often accompanies anterior or bilateral thrusting of the tongue.

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## PERSONNEL AND PROFESSIONAL NOTES

### DENTAL OFFICER RETIREMENTS 2ND QTR FY 1966

CAPT James J. Dempsey	DC USN
CAPT George W. Ferguson	DC USN
CAPT Philip Gorenberg	DC USNR
CAPT Gus W. Gray	DC USN
CAPT Charles D. Hemphill	DC USN
CAPT Harvey W. Lyon	DC USN
CAPT Neils H. Martin	DC USN
CAPT Albert R. Oesterle	DC USN
CAPT Robert S. Snyder, Jr.	DC USN
CAPT Francis H. Stodola	DC USNR
CDR Robert S. Neskow	DC USN
LCDR Aloys D. Heyen	DC USN

**ADDITIONS TO BIBLIOGRAPHY FOR ADVANCEMENT IN RATING.** The March 1966 revision to Training Publications for Advancement in Rating, NAVPERS 10052-M will include two additional bibliographies to satisfy qualifications at the DT3 (E-4) level. Both are Navy Training Courses: Hospital Corpsman 3 and 2, NAVPERS 10669, Chapter 7, and Hospital Corpsman 1 and C, NAVPERS 10670, Chapter 7. These references are intended to provide Dental Technicians at *all rating levels* with an understanding of the functions of medical elements of disaster control teams. This subject matter should be included in local in-service training programs. Items from these Navy Training Courses will begin to appear in the Navy-wide examinations for advancement in rating in Fiscal year 1967.

**NAVAL DENTAL OFFICERS CONTRIBUTE TO A NEW DENTAL JOURNAL.** Oral Research Abstracts (ORA) is the name of a new, comprehensive, research oriented abstract journal to be published by the American Dental Association. This new journal will contain abstracts, in the English language, of all dental and nondental literature relative to all phases of oral health. It is anticipated that about 9,000 abstracts will be published annually. The Editor, American Dental Association has solicited assistance in preparation of abstracts, from persons competent in the areas in which they abstract. Some abstractors will be assigned a single journal for abstracting all pertinent material. Others will be assigned specific articles within their field for abstracting.

Three Naval Dental Officers have accepted appointments to serve as Abstractors for ORA. CAPT

C. A. Ostrom will be responsible for articles of interest to dentistry in the Journal of Infectious Diseases. CAPT P. J. Boyne will be responsible for articles of interest to dentistry in Eksperimentalniya Khirurgia e Anesthezeologiya. CAPT K. C. Hoerman will abstract selected articles in the field of biochemistry. CAPT Ostrom presently serves as Head, Professional Branch, Dental Division, Bureau of Medicine and Surgery. CAPT Hoerman is Head, Research Section, Professional Branch, Bureau of Medicine and Surgery; Dental Projects Officer, Biological Sciences Division, Office of Naval Research; and Head, Biochemistry Division, Dental Department, Naval Medical Research Institute. CAPT Boyne is Director, Dental Department, Naval Medical Research Institute.

**ORAL SURGEONS AWARD.** LT H. T. Shearer DC USNR received the American Society of Oral Surgeons award for the best original basic research project completed by a Society member during the past year. His thesis, The Effect of Cobalt-60 Gamma Radiation on Surgical Extraction Healing in the Mandible of Dogs, was presented at the Forty-Seventh Annual Meeting of the Society, on 1-6 November 1965 in Denver, Colorado. LT Shearer is on duty at the U.S. Naval Hospital, San Diego, California.

**LETTER OF COMMENDATION.** A letter commending LT F. C. Layng DC USNR for his conduct during an attack on Da Nang, Vietnam, by the Viet Cong was sent by RADM F. M. Kyes. LT Layng, who is attached to MCB # in Da Nang, continued to treat others, who were more seriously injured, in spite of his own wounds. He was later evacuated and treated and returned to his duties within a few hours.

**JOURNAL COVER ILLUSTRATES NAVAL DENTAL RESEARCH.** The cover plate of the September 1965 issue of Dental Abstracts, Vol. 10, No. 9, illustrates a fluorescent microscopic specimen from the work of CAPT Philip J. Boyne DC USN, Director, Dental Research Department, Naval Medical Research Institute. The slide demonstrates bone labeling by tetracycline induced fluorescence.

**DENTAL OFFICER PRESENTATIONS.** CAPT G. H. Rovelstad DC USN, U.S. Naval Training Center, Great Lakes, Illinois, presented a lecture en-

titled The Prevention of Dental Caries, before the University of Pennsylvania Student Society of Dentistry for Children on 1 December 1965 in Philadelphia, Pennsylvania. CAPT Rovelstad also presented a lecture entitled Caries Control for the Child Patient, before the Pennsylvania Society of Dentistry for Children on 2 December 1965 in Philadelphia, Pennsylvania.

The Thirteenth Triennial Pacific Coast Dental Conference will be held 22-29 January 1966 in Honolulu, Hawaii. Table clinics will be presented by the following officers: CAPT J. W. Miller DC USN, LCDR D. L. Hall DC USN, LCDR R. S. Hulse DC USN, LCDR H. J. Keene DC USN, LCDR W. D. Loo DC USN, LT T. J. Frankmore DC USNR, LT R. L. Hendriksen DC USNR, LT J. V. Herrick DC USNR, LT D. C. Hillenbrand DC USN, LT D. R. Riley DC USN and LT B. M. Sharp DC USN.

**SUBMARINE MEDICAL CENTER AND SUBMARINE BASE DENTAL DEPARTMENT HOSTS CONNECTICUT JOINT DENTAL-PHARMACEUTICAL MEETING.** A one day Joint Meeting of the Connecticut State Dental Asso-

ciation and the Connecticut Pharmaceutical Association was held at the Submarine Base New London, Groton, Connecticut on 4 November 1965. The activities consisted of technical paper presentations in the morning and in the afternoon guided tours of a submarine, the Submarine Museum, the Submarine Medical Research Laboratory and the Base Dental Clinic. Papers were presented by the following:

CAPT G. O. Stead DC USN - Dental Facilities and Treatment in the Atlantic Submarine Force.

CAPT R. P. Scola DC USN - Clinical Evaluation of Stannous Fluoride in Preventive Dentistry.

CAPT W. F. Mazzone MSC USNR - Special Submarine and Diving Medical Problems Being Investigated at the Submarine Medical Research Laboratory.

LCDR W. R. Shiller DC USN - Effect of Stresses of Submarine Service on Oral Health.

LCDR P. G. Linaweaver, Jr. MC USN - Research Programs of the Submarine Medical Research Laboratory.

LT R. T. Larsen MC USN - Special Consideration in the Use of Drugs Aboard Submarines.

## OCCUPATIONAL MEDICINE SECTION

### MICROWAVE CATARACTOGENESIS

*H. S. Seth MD and S. M. Michaelson  
DVM, Rochester, N. Y., JOM 7(9):  
439-441, Sept 1965.*

Microwaves have been shown to produce cataracts in a variety of experimental animals. Cases of microwave cataractogenesis in man also have been reported.

In the present investigation the object was to find a cataractogenic flux density of microwaves in free air for single and multiple exposures, and to observe the development and progress of lenticular changes during a 4- to 6-month period after exposure.

#### Materials and Methods

Rabbits 3-4 months old were used. Prior to irradiation a rabbit was wrapped up to its neck in a towel and placed in a restraint box with its head protruding. The movement of the head was restricted by means of an adjustable plastic chin-rest. The animals were neither anesthetized nor tranquilized.

In all animals only the left eye was irradiated, with the right left unexposed to serve as a control. The restraint box was made of wood with an outer layer of Masonite, which absorbs microwave radiation. The box itself was placed in an enclosure with panels of microwave-absorbent material on the floor and three sides. The top of the enclosure was open. The ambient temperature during all exposures was 72-75° F.

The radiating source used was a bench-model, magnetron, continuous-wave microwave generator operated at 2800 Mc/sec. with a power output of 216 w. The output end of the wave guide had a special attachment to produce a uniform Fresnel zone field in which all radiation exposures were carried out. A Ramcor Model 1200 densitometer with a special small antenna was used to measure the flux density at various distances from the emission aperture of the wave guide. Repeated field strength readings with the animal restraint box in place (but without the rabbit) were taken and a variability of ±10-20% was shown.

Exposures were as follows:

Flux density (mw/sq. cm.)	Exposure (min.)	No. of eyes
220-240	30	1
220-240	45	1
220-240	60	3
220-240	10*	1
160-170	30	1
160-170	45	1
160-170	60	6
160-170	30**	4

\* Daily for 3 days

\*\* Daily for 5 days

The eyes were examined with an ophthalmoscope and a hand slit lamp before and at frequent intervals after exposure. The observation period extended up to 6 months in some cases; however, in most it was between 3 and 5 months.

### Results

Exposure to 220-240 mw/sq. cm. for 30 min. produced some conjunctival congestion and miosis which subsided the next day. No lenticular changes were noticed over a period of 5 months. Exposure for 45 min. at the same flux density caused a marked conjunctival reaction and purulent discharge from the eye. The animal salivated considerably during exposure and was very restless. Ten days after exposure the lens showed a nonhomogeneous blackish opacity in the upper quadrant off the posterior cortex. This progressed into a denser and more diffuse opacity, the color of which gradually changed until it was pearly white. At 20 days after exposure, the lens was completely opaque. This remained unchanged for 2½ months, after which the opacity started to retract and the retinal light reflex could be seen at the periphery. The retraction continued over the next 2 months.

The three animals exposed to 220-240 mw/sq. cm. for 1 hr. were very agitated and salivated profusely during exposure. Their eyes showed marked conjunctival injection and edema after exposure. This subsided after 3-4 days. In addition, these animals developed suborbital skin burns. The lenticular changes, however, were different. In one animal the lens appeared hazy the next day and subsequently became pearly. No further change was noted over the next 1½ months, at which time the animal died.

In the second animal the lens showed prominent suture lines and a small black opacity 12 days after

exposure. The black spot progressed into a denser, crescent-shaped area by 36 days postirradiation. In addition, some vacuoles appeared in the lower segment for a few days and then regressed. The dark area and the suture line started fading at 45 days and, by the fifty-sixth day, the lens was completely clear. A week later a small black spot appeared in the center of the lens and this progressed into an irregular but well-defined opacity by the seventy-fifth day after exposure. This again started regressing both in size and density but did not disappear until 165 days after the irradiation.

The third animal showed a small, black lenticular opacity in the lower segment of the lens 2 days after exposure which developed into an anchor-shaped opacity at 15 days and remained stable until the animal died at the forty-fifth day after exposure.

One rabbit was exposed to 220-240 mw/sq. cm. for 10 min. daily for 3 days. This one showed marked agitation and salivation even during the short periods of exposure. The reaction of the eye was also very violent, and 2 days after the last exposure a severe uveitis developed and resulted in the formation of a complete pearly opacity of the lens. The eyeball shriveled up and the lenticular changes remained unaltered for the observation period of 6 months.

A 30-min. single exposure at 160-170 mw/sq. cm. to one rabbit produced only mild conjunctival reaction which subsided the next day. In this case a tiny black speck appeared in the posterior cortex of the lens and remained unchanged for 5 months. Exposure at the same flux density for 45 min. did not produce any lenticular changes.

All 6 rabbits exposed to 160-170 mw/sq. cm. for 60 min. showed moderate conjunctival reaction. Four of these showed lenticular changes. In 3, diffuse nonhomogeneous black opacities appeared in the posterior cortex 1-2 days after exposure. This was transitory and cleared completely by the fourth day. Well defined small opacities appeared 5-7 days after exposure and soon completely regressed in 1 animal, remained stable in the second, and waxed and waned in the third over a period of 4 months. In the fourth animal a small central lenticular opacity which appeared at 20 days was unchanged 3 months later.

Four rabbits were exposed to 160-170 mw/sq. cm. for 30 min. daily for 5 days. In 1 of these a diffuse nonhomogeneous blackening of the lens was apparent on the third day of exposure, and this cleared the next day. Otherwise, in this series no len-

ticular changes were observed over a period of 3 months.

#### Comment

In the present study, two distinct types of lenticular lesions were seen. The first is a rapid and complete opacification of the lens. This is associated with grossly visible damage to other ocular structures and is produced by exposure to high intensities of microwaves. The other, produced by low-intensity microwaves, involves development of small lenticular opacities after a latent period of several days to several weeks. In this lesion the associated damage or reaction of other ocular structures is minimal. The small lenticular opacities, moreover, show a tendency to regress, disappear completely, and to reappear in some cases. Similar observations have been reported in the literature.

A nonhomogeneous, posterior, subcapsular blackening of the lens was observed 1 or 2 days after exposure to low-intensity radiation in several cases. This as a rule cleared completely within 2-3 days. It is suggested that the appearance is produced by intumescence of the lens fibers and is a reversible change.

In the eyes exposed to 160-170 mw/sq. cm. for 30 min. daily for 5 days no lenticular changes were found. This finding is at variance with results of other workers. The damage caused by exposure to this flux density for this time is probably quickly reversible and is not cumulative.

On the basis of the results reported above, and assuming the human lens to be of the same order of sensitivity as that of the rabbit, then the permissible exposure density of 10 mw/sq. cm. is conservative and gives a wide margin of safety.

#### Summary

1. The eyes of rabbits were exposed to 2800 Mc/sec. continuous microwave radiation at flux densities of 160-240 mw/sq. cm. Exposures lasted 10-60 min.
2. Lenticular changes in the form of rapid and complete opacification developed after exposure to 220-240 mw/sq. cm. for 1 hr.
3. Transient intumescence of the lens fibers was apparent at the lower exposure levels.
4. Daily exposures for short periods did not produce any cumulative effect.

#### CANCER EDUCATION AND DETECTION PROGRAMS AT THE PLANT LEVEL

*W. E. Herrmann, Cincinnati, Ohio, JOM  
7(9): 431-433, September 1965.*

Our company is highly decentralized. Within broad policy parameters, Employee Relations managers at more than 100 plant locations are free to institute programs and policies which best fit local needs.

Our employee relations philosophy is that a company is a voluntary association of employees who have joined the company simply because they believe they can accomplish more and be better compensated—in terms of pay, benefits, opportunity, and other job satisfactions—than with another company or in a business or profession of their own. Despite our rather broad benefit program, there is no paternalism. This concept of voluntary association, recognizing that employees are the company, carries with it a responsibility on the part of management employees to keep all other employees fully informed.

To provide information in a meaningful way, we have in employee and community relations a small group of professional industrial communicators. These people work primarily with managers throughout the plant to assure that a steady, accurate flow of meaningful motivational information takes place between the manager and the man.

#### The Program

Education. The core around which our communication effort is built is the monthly round-table meeting. Each month, every first-line manager in the plant is required to meet with those who report to him for a discussion of the business outlook and such topics as level of effort, safety, discipline, benefits, and countless other pertinent matters. Managers are thoroughly supported in this effort through a monthly publication which provides them with discussion outlines on topics of major or plant-wide interest.

Obviously, foremen and managers cannot be made into medical experts. Instead we provide from our internal speakers' bureau, physicians and nurses who can speak authoritatively on the subject of cancer detection. The system works quite simply. The foreman calls our communication operation and requests a speaker on any of the 30 subjects we list. Quite often these days the subject is cancer. Our management communication specialist makes the arrangements, including film or slide facilities, if de-

sired, and notifies our health and hygiene operation that a speaker has been requested. Question-and-answer sessions which follow the doctors' brief talks are quite spirited.

Our doctors and nurses always find time in their crowded schedules for a talk on cancer, because these meetings with employees are invaluable for building the kind of doctor-patient rapport often so difficult to attain in the industrial situation.

As part of our information effort we publish a tabloid-size, 2-page, daily newspaper. Any similar publication, daily, weekly, or monthly, can be used to sell employees on safety or health or early cancer detection.

The return is measurable in dollars and cents. Cancer is in the news today; it is on most employees' minds, and readership can actually be built with a well-conceived, well-written cancer education campaign.

Recently, as part of our continuing cancer education program, we obtained from the American Cancer Society an excellent film entitled, "Time and Two Women". We ran a brief article in our daily newspaper announcing that the film would be shown in one of our classrooms to any women who were interested in seeing it. Overnight response forced cancellation of the original showing, and the scheduling of four showings in the two auditoriums in the plant. Two days later, response from our hourly women employees prompted two special early showings during their lunch period. In less than 2 weeks, more than 1000 female employees had seen the film voluntarily, on their own time, either during lunch hours or after work.

We make full use of the films, slide presentations, pamphlets, and other material available without charge from the American Cancer Society. We would be foolish not to, because this material is well-designed, clearly written, objective, and free.

Where major employee publications or a formal round-table program are not available, pay envelope stuffers (available without charge from the American Cancer Society) are valuable, as are free booklets placed in reading racks. A letter to employees' homes (from the medical director, manager, or company president) on the subject of cancer detection will find a ready interest in almost every employee home. Employees will appreciate this managerial concern, and an employee with early cancer who is motivated to see his doctor will repay the small cost many times over. Colorful posters, again free, are available for bulletin boards. Noontime movies re-

quire only an area which can be darkened and a 16-mm projector, both available in nearly every plant in the country. With proper counsel, cured employees can spread the word on early detection. They will be proud to be asked to help. At one time or another, we have used just about every one of these means to bring the "cancer detection-cancer can be cured" story to our employees.

This report has purposely avoided the human suffering side of the story almost completely. The reason is simple. Management's attention and approval may be gained by stressing a proposed program as a cost-reduction effort. This is valid and reason enough for doing it. Management is aware of the "dreaded" aspects of this disease. An altruistic or medical approach could be disadvantageous. Top managers are just as concerned about cancer, just as personally afraid of it, as any employee in the plant; they should be given a chance to sell themselves on a cancer education program. If upper management can be convinced that money can be saved—especially when the cost of saving it is small—support will be forthcoming.

Before the program is presented to management, it should be thoroughly and carefully planned. It should be a campaign that is an integrated effort, that builds over a time to whatever level of interest and action one expects from employees. A minimum of several months is required, but a program should be one that continues over years, not months.

Information on what local firms and competitors are doing in cancer education (available from the local Cancer Society chapter) can be helpful. The society is also helpful in the selection of materials around which a campaign can be built. The aid of the plant communicator or editor can prove invaluable in preparing the presentation to management, and later too, once the program is underway.

#### Detection

Physical examination programs can be useful in detecting cancer. Although we believe employees are responsible for their own lives and their own health, we do have a regular examination program ranging from annual physical examinations for upper and middle management, through biennial examinations for other exempt employees, to less frequent physicals for other employees depending upon their age. None of these physicals constitutes a thorough cancer checkup including tests, smears, and so on, although a chest x-ray film is taken, and, if the em-

ployee requests it, other standard cancer detection examination techniques are used. If one of our plant physicians has any cause at all to suspect the possibility of cancer, or, for that matter, any other major health problem, the employee is urged to see his own physician; most do.

It is natural that employees will resist to some extent confiding in a company doctor their fears regarding cancer. These fears can be reduced substantially, however, through a cancer education program, especially if employees understand that cancer will not necessarily cost them their jobs, that it can be cured, and that they may not have to leave their jobs to take treatment—all if it is detected early enough.

That fear can be overcome is illustrated by another program we conduct at Evendale. This program deals with what we have come to recognize as an incurable disease—alcoholism. We began our efforts several years ago and met with considerable employee resistance. This was before people began to realize that, while alcoholism cannot be cured, it can be controlled by the patient, and alcoholics can lead responsible, productive lives. We began to break down this fear with an educational program, explaining the nature of alcoholism through a column in our employee newspaper written and signed by our medical director. Slowly, employees with this problem came forward, looking for help. Sometimes a foreman or manager would counsel an employee to join the program. Sometimes it was the foreman or manager himself who joined. The employee, either in private or preferably group therapy, is helped to realize that he alone can control the problem. As soon as possible, we urge him to seek help from his clergyman, his family doctor, or an organization such as Alcoholics Anonymous, because the problem and the solution are his responsibility. No one has ever been fired for drinking while on this program, and soon the word got around. Today, quite often, the union will refer an employee. Certainly, there is less stigma on cancer in the minds of employees than on alcoholism. Employee fear can be overcome.

The American Cancer Society stands ready to provide professionally prepared material and other assistance at no cost to the company; employee interest is high—the thousand women crowding our auditorium proves that; and management can be sold on the value of a cancer education program.

## U.S. DEPT. OF AGRICULTURE REMOVES THALLIUM SULFATE FROM HOUSEHOLD USE

*HEW, PHS, National Clearinghouse for Poison Control Centers, Sept-Oct 1965.*

The U.S. Department of Agriculture has announced a revised interpretation of Federal pesticide regulations. It eliminates from labels all directions for use of thallium sulfate in and around private households.

Regulations covering registration of pesticides in interstate commerce are administered by the U.S. Department of Agriculture's Agricultural Research Service under the Federal Insecticide, Fungicide, and Rodenticide Act. Under this Act, all pesticide products must be registered with the Secretary of Agriculture before they can legally be shipped interstate.

The new interpretation requires that labels accepted by USDA's Agricultural Research Service in registering thallium products intended for use in a household environment must display a clear and prominent statement that the product may be applied only by qualified personnel of a Federal, State, or local government.

Thallium compounds (sold for home use as baits for roaches, ants, and rodents) already were restricted as to labeling and percentage of thallium which they could contain. Extensive directions for use, designed to assure safety, have been required on labeling of products containing this highly toxic chemical. Reports indicating that these directions have not always been carefully followed have led USDA officials to regard private household use of thallium as a health hazard. Other effective insecticides and rodenticides are available for such use, the officials point out.

Besides requiring a statement limiting directions for household use of thallium to government agencies, the new interpretation also requires labels of these products to bear a clear and prominent warning against sale to the general public. Interpretations of Federal pesticide regulations are available to give manufacturers of pesticides information that will help them satisfy the requirements of the regulations when products are submitted for registration.

## SMALL CARS SAID TO BE MORE DANGEROUS

*The Health Bulletin, The Official Publication of the North Carolina State Board of Health, Aug 1965.*

People who drive small foreign cars or American compacts are more likely to be injured or killed in an automobile accident than those who drive standard American cars, so revealed a two-year study of 12,835 cars involved in rural accidents conducted by Cornell's Automotive Crash Injury Research Project. The frequency of moderate injury was about 10 percent higher in small cars than in standard cars; the frequency of dangerous and fatal injury was about 20 percent higher; and the frequency of fatality was about 30 percent higher in compact cars and 50 percent higher in small cars.

The main danger in small cars is being thrown through the windshield or out the door during an accident. This is about 60 percent more likely to happen in small cars and 25 percent more likely in compact cars. B. J. Campbell, Ph.D., assistant director of the study, explains, "The risk of serious injury is at least twice as great if a person is thrown out of his automobile during a crash than if he remains in the car." Dr. Campbell says the injury risk from ejection could be reduced if all passengers wore seat belts or harnesses and if all cars had safety door latches. These latches were lacking in most foreign cars in the study, although they have been on all U.S. cars since the 1956 models.

## SAFE PRACTICES FOR INDUSTRIAL SCUBA DIVING

*Peter A. Breysse MS MPH, Seattle, Washington, Industrial Medicine & Surgery, 34(11): 870-873, November 1965.*

It is safe to state that SCUBA (self-contained underwater breathing apparatus) diving has become a popular sport, a sport practiced by well in excess of three million devotees.

In addition to the sporting aspects, there has been in recent years an increase in the use of SCUBA diving for research and commercial purposes including locating and retrieving sunken objects, placing of underwater explosives, inspecting and maintaining submerged structures, laying of underwater pipe lines and salvaging sunken logs.

Since the use of SCUBA is gaining in importance as an industrial "tool" and since a good many of the members of this occupation in the State of Wash-

ton are covered under the State Industrial Accident Insurance Act, a question arises regarding the necessity for an industrial code of safe practices. To provide an intelligent answer to this proposition it becomes necessary to scrutinize all of the potential hazards associated with the performance of this task and to examine, if possible, past experience.

First, an examination of the records reveals that during the past year three fatalities were experienced by workers while actively engaged in industrial SCUBA diving. In addition there occurred at least one industrial accident resulting in the "bends".

Four cases certainly do not constitute a dire need for a code. If, however, account is taken of the relatively small number of persons engaged in this occupation, then four accidents resulting in three fatalities constitutes a rather high accident rate and most certainly a very high fatality rate. "Divers are usually paid a minimum of \$20 to go into the water and \$20 an hour." The rates may be higher depending on the hazard and nature of work. One reason the cost is high is because of the large amount of insurance a skin diver must carry and the high premiums for this insurance. Another reason for the high charge is because divers often have to break safe diving rules and there is a large risk involved. Divers may have to dive too deep for their equipment or dive alone—two hazardous ways of diving.

The most important concept relating to any program of adequate protection in a hazardous undertaking concerns the recognition of all of the potential dangers associated with the task. In industrial SCUBA diving the hazards are many, are at times complex and may involve the interrelationship of a number of important factors: the diver, his equipment, his air supply, the underwater environment and the task to be accomplished.

### The Diver

SCUBA diving involves heavy exertion. Even if a diver goes down only for observation purposes and does not perform any other function, he will sooner or later find himself in positions that tax his strength and endurance. It is therefore of utmost importance that the diver be physically qualified to perform this function. Persons with certain physical defects should not be permitted to dive or should be strictly limited. These defects include the ability of middle ear and sinuses to equalize pressure changes, lung disorders, alcoholism, chronic gastrointestinal disorders, cardiovascular system abnormalities, certain diseases, active venereal disease, and any organic or

neurologic disorders, or a history of epileptic episodes or loss of consciousness. Since physical condition is important to diving, whenever any question arises regarding a diver's capabilities for diving, the advice of a physician versed in diving hazards should be sought.

A psychological examination may also be in order since claustrophobia, recklessness or emotional instability and other such manifestations may seriously endanger a diver underwater. A diver, therefore, must be physically and mentally competent to function effectively and safely underwater.

### Equipment

The safety of a diver is dependent in part at least upon the effective operation and dependability of his equipment. While a good deal of the commercially available equipment is well-designed and is of sturdy construction, its successful operation over the long run depends upon periodic inspection and adequate maintenance. Some suggested criteria regarding equipment follows:

#### Demand Regulators

1. *Mechanical Construction:* (a) All parts should be of corrosion resistant material of sufficient strength and durability to provide safe operation under all conditions of use; (b) Construction should be such that every part can be tested, inspected and repaired or replaced by persons skilled in such work; (c) All vital parts should be so constructed or protected as to minimize the possibility of damage under normal conditions of use or storage; and (d) Equipment should provide freedom of movement and be reasonably comfortable under all conditions.

2. *Air Tanks:* (a) Tanks should be expressly made for SCUBA diving and should be constructed and stamped in accordance with the Interstate Commerce Commission (ICC) regulations; (b) Tanks should be fitted with a closing valve designed to fit and seal against the high-pressure air entry port of most SCUBA regulators; (c) The closing valve should not be capable of being screwed entirely out of its housing by the wearer; (d) The closing valve should be operable by hand without the use of wrenches or external levers of any kind; (e) Tank interiors should be protected with a corrosion-resistant finish unless tank is made of corrosive-resistant material; and (f) Tank harnesses should provide freedom of movement and should be reasonably comfortable under all conditions of use. The harness should possess a quick release easily accessible and operable by the wearer with either hand.

3. *Diving Masks:* (a) Unrestricted depth types should be watertight over eyes and nose of wearer; glass face plate should be of shatter-resistant construction; should be reasonably comfortable under all conditions of use; and (b) Restricted depth types should be watertight over eyes, nose and mouth and be an integral part of SCUBA unit; glass face plate should be of shatter-resistant construction; should be reasonably comfortable under all conditions of use; should be used to depths no greater than 35 feet.

#### Air Supply

"Pure" compressed air is the gas of choice of SCUBA diving. Unfortunately it is not always possible to obtain "pure" air, and furthermore, there is as yet no universal agreement as to what constitutes "pure" air. Potential contaminants likely to be encountered in compressed air include carbon monoxide, carbon dioxide, oil vapors or droplets, and a number of other exhaust gases.

Compressed air for SCUBA diving can be obtained from sport shops and marinas or divers may utilize their own compressors. In too many instances little or no thought is given to the purity of the air or the precautions necessary to insure a safe air supply. By way of mention, one often sees advertised "certified air" for sale, yet this statement has no official meaning. Even if there were standards defining certified air, these standards in themselves would not guarantee a safe air supply.

As mentioned previously, a number of contaminants may be encountered in compressed air. Carbon monoxide is one of importance. The source of carbon monoxide in the breathing medium is usually one of the following:

1. In oil-lubricated, high-pressure compressors, cylinder temperatures may become high enough to promote partial combustion of the lubricant.

2. If a portable gasoline engine is utilized to drive a compressor, there is always the possibility of the exhaust gases reaching the intake. Contamination of intake air from other sources of exhaust gases can also occur.

At present some groups define breathing air for diving as air which meets the following criteria: (1) Oxygen—Atmospheric; (2) Max. CO (for decompression dives)—10 ppm; (3) Max. CO (for non-decompression dives)—20 ppm; (4) Max. CO<sub>2</sub>—300 ppm; (5) Dust and droplets of oil & water—absent; and (6) Odors and vapors—absent.

In an examination of some 25 SCUBA tanks for the presence of CO, it was found that only two tanks

had no CO present. Eighteen of the tanks had CO concentrations of between approximately 10 to 25 ppm. Five of the samples were greater than 25 ppm with one sample showing a CO concentration of 50 ppm and one as high as 75 ppm.

In view of the potential hazards associated with the production of compressed air, a number of precautions should be observed whenever air is being compressed for diving purposes:

1. Compressor intake should be located so that air entering the compressor is free from contamination by exhaust from internal combustion sources or from any other source.

2. Dust filter should be connected to the air intake.

3. The use of a water-lubricated compressor is considered to be best for preparation of compressed air for diving purposes.

4. If an oil-lubricated compressor is used, a number of precautions are in order to prevent contamination of the compressed air with carbon monoxide, oil vapors or carbon dioxide. They are: (a) Proper compressor maintenance is important. Particular attention should be paid to the piston, rings and oil consumption; (b) Precautions must be taken to prevent overheating of the compressor since this can result in oil breakdown products. The breakdown temperature of all lubricants should be obtained, and operation of the compressor should be stopped at some lower temperature; (c) A filtering system should be provided between the compressor and the supply bottles. If air is stored in large bottles, it would be desirable to provide a filter system between the storage bottles and the SCUBA tanks; (d) It would also be desirable to provide frequent tests for the presence of carbon dioxide and carbon monoxide. Testing, however, should not take the place of good operating and maintenance procedures; (e) A log should be kept of the compressor operation; (f) A periodic schedule of filter examination and filter change should be provided; and (g) Periodic maintenance and overhaul of compressor should also be provided.

#### Underwater Environment

The underwater environment contains a number of hazards. The most important of these is depth-to-pressure effect. Gerald J. Duffner, M.D., in a report prepared for Metropolitan Engineers, 410 West Harrison Street, Seattle, Washington, described what happens to an individual when he is exposed to increased pressures. A person at atmospheric pressure has approximately one quart of nitrogen dissolved in

the body. If the course of nitrogen elimination from a human is followed, it would be found that the first pint is given off in about 40 minutes; somewhat less than a half pint is eliminated in the next 40 minutes; and the rest is removed in an additional 11 hours. If the pressure is increased to two atmospheres (33 feet of water), the body can contain a maximum of two quarts of nitrogen in solution. At three atmospheres (66 feet of water), the body can contain three quarts in solution; and at four atmospheres (99 feet of water), four quarts. Suppose that the diver while underwater worked at a depth for a sufficient length of time to accumulate two quarts of nitrogen in solution in the body and was then suddenly brought to the surface. Since it takes a person approximately 12 hours to rid the body completely of nitrogen at atmospheric pressure, it is obvious that the diver suddenly brought to the surface cannot immediately rid himself of the extra quart of nitrogen. As the gas cannot be held in solution, the only place for it to go is to collect in bubbles throughout the body. These bubbles of gas are not normally found in human tissues or blood and in certain body locations these bubbles can produce real damage resulting in intense pain, serious illness and even death. A common name for this condition among divers is "bends".

Other potentially dangerous environmental conditions concern shifting underwater objects caused by tides, currents or surges. Boats or other water craft over the diving area can cause problems by dropping anchors or other heavy objects on the diver. In addition, craft operating in this area may collide with the diver. Murky water conditions can limit visibility in some instances to as little as a few inches, making the hazard potential much greater. Also, encounters with sea creatures can, in some cases, result in injury or poisoning.

#### The Task

In some circumstances it may be necessary for a diver to perform functions underwater requiring a special mechanical skill. He may have to handle and set explosive charges or he may have to use various tools or mechanical devices such as cutting torches, hand tools or special tools. Without the necessary skills to handle these tools and materials and without a knowledge of the potential hazards associated with their misuse, the diver will not be able to accomplish his task in a reasonable time and he may injure or even kill himself in the process.

## Summary

Recognizing that SCUBA divers are subject to many potential hazards and that they must be physically and mentally fit, be adequately trained in the use of SCUBA and possess the necessary mechanical skills to perform their prescribed functions satisfactorily; and that their safety and well-being depends to a large degree upon equipment being in good working order and upon an air supply essentially free from contamination; the Safety Division, Washington State Department of Labor and Industries,

appointed a committee to assist the Code Engineer in the completion of SCUBA Diving Safety Standards. This committee was composed of representatives of both labor and management and other interested groups, large number of which had considerable experience in SCUBA diving activities and diving medicine.

These standards should provide a better awareness of the hazards involved in diving, in addition to minimum requirements for diving safety; recognizing that diving can be safe provided it is practiced by well-trained, equipped and informed individuals.

## EDITORIAL DESK

### NAVY MEDICAL HISTORICAL FUND

For many years the Fund has provided the cultural tie between the past and present in the Medical Department of the Navy.

Information is sought regarding the location of interesting historical documents and items. Knowledge concerning such material should be communicated to the Chairman of the Fund. Contributions to maintain a sequence of portraits for the Stitt Library and for the preservation of historical material are needed at present because the treasury is depleted. Let's make '66 the year for financial replenishment and for the increase in historical data! Contributions should be addressed to the Treasurer, Navy Medical Historical Fund, Bureau of Medicine and Surgery, Navy Department, Washington, D.C. 20390.

S/F. M. KYES  
Rear Admiral DC USN  
Chairman

### SURGICAL CONFERENCE

A Surgical Conference sponsored by the Veterans Administration will be held at the Boca Raton Hotel and Club, Boca Raton, Florida on 21 and 22 March 1966, the two days prior to the A.S.A. meeting. Subjects to be discussed at the conference are "Recent Advances in Surgery", to include Recent Advances in Thoracic Surgery, Head and Neck Surgery and Surgery of the Endocrines; "Infections" and "Cardiac Resuscitation".

The Veterans Administration has extended an invitation to the Navy for the attendance of Navy surgeons, at this conference. The hotel has quoted a special rate of \$22.50 per person per day, two in a room, which includes three meals. Only a limited

number of officers can be authorized to attend the conference on travel and per diem orders chargeable against Bureau of Medicine and Surgery funds. Those officers who cannot be provided with travel orders to attend at Navy expense may be issued Authorization orders by their Commanding Officers. Requests should be forwarded, in accordance with BUMED INSTRUCTION 1520.8 Series.

Approved attendees should notify Doctor Herbert R. Hawthorne, Chief of Education in Surgery, Veterans Administration, U.S. Post Office Building, 402 East State Street, Trenton 9, New Jersey of their attendance and request reservations with the hotel direct, mentioning that they will be attending the Veterans Administration Surgical Conference. Early reservations should be made since this conference is held at the hotel's busy season.—Training Branch, BuMed.

### DISTRIBUTION OF SCIENTIFIC INFORMATION

The life's blood of scientific advance has always been the exchange of information between competent researchers. This is no less true in the military than in civilian scientific circles. However, from the military point of view, emphasis must be placed on the word "exchange". Certainly the distribution of the fruits of military research to addressees in countries known to be antagonists of the United States, cannot be held to be in the national interest unless useful information is obtained in return, i.e., unless an exchange of information occurs.

Naval scientific personnel hardly need to be reminded of the necessity to protect and limit the distribution of classified information, but it is not widely understood that the distribution to Iron Curtain

addressees of unclassified scientific information resulting from military research and development may be detrimental to the United States and that such distribution generally is not in the national interest.

Medical Department personnel and activities considering distribution of unclassified naval medical research reports to foreign addressees are advised to refer to OPNAVINST 3821.3A of 2 November 1964 prior to such release. Care should be taken to insure that some advantage will or is likely to accrue to the United States as a result of such distribution. Scientific research reports from naval medical department activities should not be released solely because they have been requested.—Research Division, BuMed.

#### TAYLOR CUP AWARD

LT Charles W. Kerber MC USN, was presented the Admiral Montgomery M. Taylor Cup Award in ceremonies held at the U.S. Naval Hospital, National Naval Medical Center, Bethesda, Maryland. The award was made by CAPT G. M. Davis MC USN, Commanding Officer of the Hospital.

The cup, named in honor of Admiral Montgomery M. Taylor USN, deceased, is presented just prior to Christmas each year to that handicapped patient selected as the one who has most consistently demonstrated exceptional spirit, courage, fortitude, and determination in overcoming his physical handicap.

#### NAVMEDSCOL TRAVELING TEACHING TEAM TO MAKE DEBUT AT PENSACOLA, FLA.

Under the leadership of CAPT John H. Stover, Jr., MC USN, Commanding Officer of the U.S. Naval Medical School, National Naval Medical Center, Bethesda, Maryland, a team of specialists traveled to the U.S. Naval School of Aviation Medicine, U.S. Naval Aviation Medical Center, Pensacola, Florida. The team presented a one-week course, beginning 18 October 1965, in "Nuclear, Biological and Chemical Warfare Defense." It was composed of lecturers from the U.S. Naval Medical School, and the Nuclear Weapons Training Center, Atlantic, Norfolk, Virginia. The course consisted of a series of lectures and demonstrations to emphasize the medical aspects of special weapons and to delineate the medical department responsibilities in defense against their possible use by an enemy.

The use of traveling teaching teams is not a new concept to the Navy. Their importance in military

LT Kerber, a flight surgeon, was involved in the crash of a jet aircraft on April 21, 1965 while on a training flight at the U.S. Marine Corps Air Station, Cherry Point, North Carolina. Upon ejecting from the plane, he landed in the burning wreckage receiving extensive burns over many areas of his body. During the past several months he has been undergoing reconstructive surgery primarily involving rehabilitation and reconstruction of his hands. Although LT Kerber was often in severe pain during this prolonged treatment and hospitalization, he was always cheerful, cooperative, and a great inspiration to other patients. Determined to continue his medical career but realizing that it would be most difficult to follow his original plan of pursuing a surgical specialty, he has applied for and been accepted for residency training in radiology at the University of Pittsburgh Hospital upon release from the Navy.

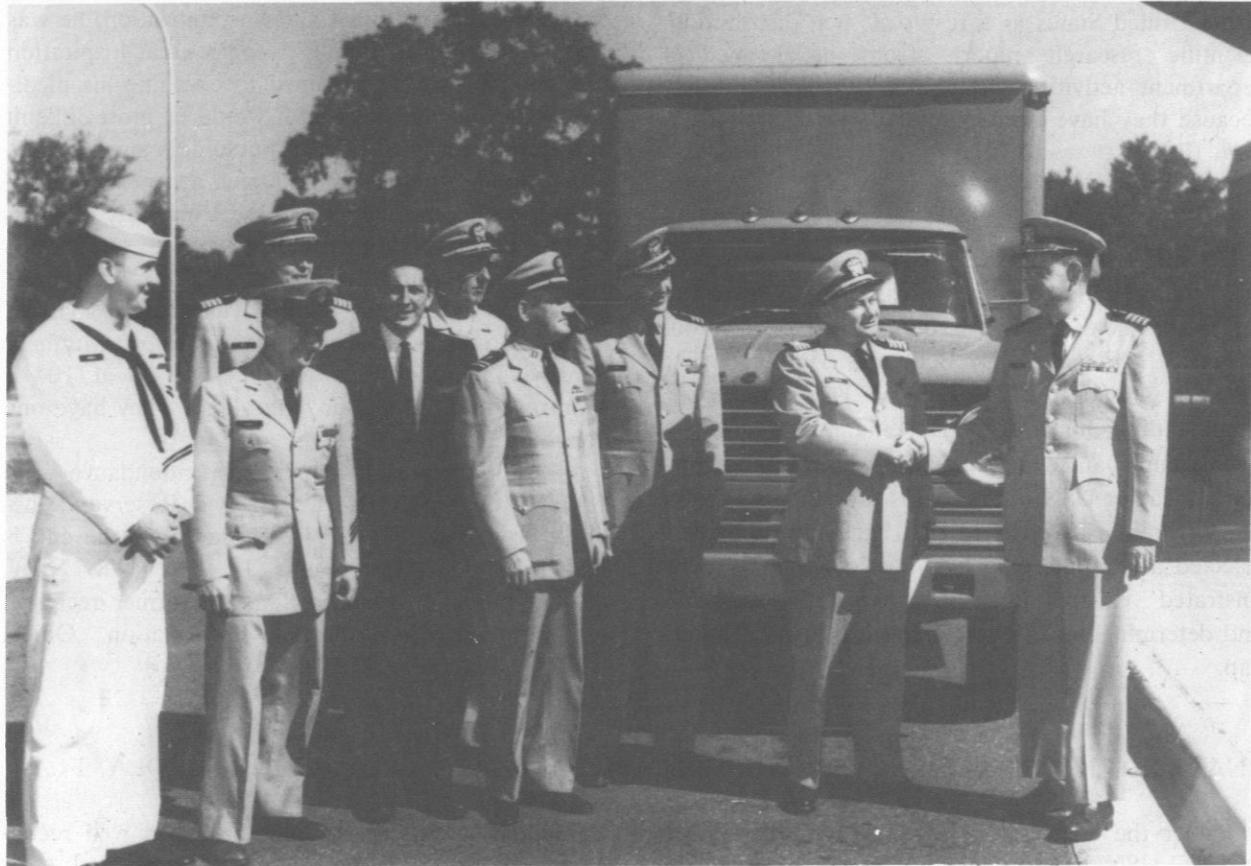
LT Kerber is the son of Mr. and Mrs. Charles S. Kerber of McKeesport, Pennsylvania. He is married to the former Miss Claire DeLandro of Munhall, Pennsylvania, and they presently reside at 10413 Montrose Ave., Bethesda, Maryland. They have one daughter, Laura.

In addition to staff members, in attendance were CAPT Roy Smith III, U.S. Naval Reserve, a nephew of Admiral Taylor in whose honor the cup is named; and RADM Louis J. Kirn, U.S. Navy, Deputy Director, Joint Staff and a former recipient of the award.—Technical Information Office, NNMC, Bethesda, Md.

training programs in the past has been well recognized. "The activation of such teams and their proper deployment is one answer to today's need for the rapid dissemination of highly specialized information to Medical Department personnel", said CAPT Stover in a recent interview. "They spell economy in time, money, personnel and materials", he continued, "because through the concentrated efforts of a few, well qualified, imaginative specialists an effective training program can be developed. This relatively small group of instructors with their teaching materials and audio-visual aids can be transported economically to training sites. In some cases, these locations may be activities where large numbers of the on-board personnel require the training. In other instances, they may be central locations to which numbers of trainees may be transported comparatively short distances for training. Through

this means, trainees are brought into personal contact with experienced specialists for well developed programs of instruction. Such a situation is conducive to generation of the active interest which is basic to effective training programs. The use of teaching teams in this manner eliminates the duplications of effort which result when numerous military activi-

ties simultaneously attempt to fulfill the same training requirement." According to CAPT Stover, this teaching team may be made available to other military medical activities as the need arises. Further information concerning its availability can be obtained by writing to: Chief, Bureau of Medicine and Surgery, Navy Department, Washington, D.C. 20390.



Pictured above is CAPT John H. Stover, Jr. MC USN, Commanding Officer of the U.S. Naval Medical School, National Naval Medical Center, Bethesda, Maryland being greeted by CAPT Vance E. Senter MC USN, Head, Training Department, U.S. Naval Aerospace Medical Institute, U.S. Naval Aviation Medical Center, Pensacola, Florida upon arrival of the NAVMEDSCOL Teaching Team in Pensacola, Florida.

Members of the teaching Team pictured from left to right are: Front Row: HM2 Eugene R. Kemble USN, HMC Robert Kochel USN, Mr. Ralph Buonomo, LT William E. Pitzer MSC USN and CDR Walter E. Beam MSC USN; Second Row: CAPT Gordon C. Bell MSC USN and CDR Edmund H. Gleason MSC USN. Members of the Team not shown in the picture are CDR Gordon W. Werner MSC USN, MAJ J. A. Hamilton USMC and LCDR R. J. Shanley USN.

# IMPORTANT NOTICE

## U.S. NAVY MEDICAL NEWS LETTER RENEWAL REQUEST IS REQUIRED

Existing regulations require that all Bureau and office mailing lists be checked and circularized once each year in order to eliminate erroneous and duplicate mailings.

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Also, PLEASE PRINT LEGIBLY. If names and addresses cannot be deciphered, it is impossible to maintain correct listings.

—Editor

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